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Title: Guaranteed Quality of Service in an Asynchronous Metro Packet Transport Ring
Application Number: 09/608,747

Claims

This listing of claims replaces all prior versions and listings of claims in the present application.

1. (Currently Amended) A metropolitan area packet rings comprising:
a fiber optic loop carrying asynchronous data packets, wherein the asynchronous data packets flow in a single direction through the fiber optic loop;
a plurality of metropolitan packet switches coupled to the fiber optic loop, wherein a metropolitan packet switch is comprised of an I/O port coupled to the fiber optic loop which inserts packets of data onto the fiber optic loop and which pulls packets of data off the fiber optic loop;
a processor coupled to the I/O Port which separately ~~regulates~~ increases and decreases data rates at which existing individual flows of data packets are transmitted over the fiber optic loop, the data rates increased or decreased on a per-flow basis, wherein ~~quality of service is maintained on said per-flow basis~~ said increases and decreases are performed while maintaining quality of service on a per-flow basis.

2. (Cancelled).

3. (Previously Presented) The metropolitan area packet ring of Claim 1:
wherein the processor decreases a data rate of a flow upstream to a point of congestion in order to maintain quality of service.

4. (Original) The metropolitan area packet ring of Claim 1:
wherein bandwidth that becomes available is allocated amongst a plurality of flows.

5. (Original) The metropolitan area packet ring of Claim 4:
wherein the metropolitan packet switch allocates available bandwidth according to a pre-determined weighting scheme.

6. (Previously Presented) The metropolitan area packet ring of Claim 1 further comprising:
a ring management system coupled to one of the metropolitan packet switches which sets up the metropolitan packed switches in order to maintain pre-determined quality of service on a per-flow basis.

7. (Original) The metropolitan area packet ring of Claim 1:
wherein the quality of service includes a variable bit rate with a minimum bandwidth.

8. (Original) The metropolitan area packet ring of Claim 1:
wherein the quality of service includes a constant bit rate with a minimum delay.

9. (Original) The metropolitan area packet ring of Claim 1:
wherein the metropolitan packet switch performs rate shaping.

10. (Original) The metropolitan area packet ring of Claim 1:
wherein the data packets transmitted through the fiber loop comprise 10 gigabit Ethernet.

11. (Currently Amended) In a metropolitan area packet ring having a plurality of switching devices through which a plurality of devices are coupled to the metropolitan area packet ring, a method for managing packetized traffic flowing asynchronously in a single direction through the metropolitan area packet ring to maintain a particular quality of service for a subscriber, comprising the steps of:
assigning the particular quality of service to the subscriber;

~~controlling said~~ a plurality of metropolitan packet switches of the ring increasing or decreasing existing rates of individual flows of said asynchronous data packets being transmitted over the metropolitan area packet rings on a per-flow basis so as to provide the subscriber with a minimum bandwidth uni-directional QoS flow, regardless of the congestion on the metropolitan area packet ring.

12. (Cancelled).

13. (Previously Presented) The method of Claim 11 further including the steps of:
determining packetized data congestion corresponding to particular segments of the metropolitan area packet ring;
adjusting a data rate upstream to a point of congestion in order to maintain that the minimum bandwidth assigned to the subscriber is being met.

14. (Original) The method of Claim 11 further comprising the step of:
allocating bandwidth that becomes available to subscribers according to a pre-determined weighting scheme.

15. (Original) The method of Claim 11:
wherein the packetized data flowing through the fiber optic loop is comprised of Ethernet packets.

16. (Original) The method of Claim 15:
wherein the fiber optic loop is comprised of 10 Gbit Ethernet.

17. (Original) The method of Claim 11:
wherein the quality of service corresponds to either a variable bit rate with a minimum bandwidth or a constant bit rate with a minimum delay.

18. (Currently Amended) A ~~device~~ metropolitan packet switch for routing packetized data in a packet ring, comprising:
a first port configured to insert data packets onto the packet ring;
a second port, downstream from the first port, configured to take data packets off from the packet ring;
a processor coupled to the first port which regulates data packets flowing asynchronously through the packet ring on a per-flow basis, by increasing or decreasing the data rate of existing individual flows, wherein
bandwidth which becomes available is re-allocated in accordance with a predetermined weighting scheme;
the asynchronous data packets flow in a single direction through the packet ring; and the data rate of a uni-directional QoS flow is maintained on a per-flow basis.

19. (Cancelled).

20. (Previously Presented) The device of Claim 18:
wherein the processor adjusts the data rates such that quality of service is maintained.

21. (Original) The device of Claim 18:
wherein the processor controls a rate by which data packets belonging to upstream flows are allowed to be inserted onto the packet ring.

22. (Original) The device of Claim 18 further comprising:
a circuit which allocates available bandwidth on a per-flow basis.

23. (Original) The device of Claim 18:

wherein the data rates of upstream flows are increased according to a pre-determined weighting scheme.

24. (Original) The device of Claim 18:
wherein the packet ring is comprised of a fiber loop.

25. (Currently Amended) In a metropolitan area packet ring having a plurality of switching devices coupled to the packet ring, a method to manage packetized traffic flowing asynchronously in one direction through the packet ring, comprising the steps of:
assigning initial bandwidths corresponding to a plurality of subscribers;
determining packetized data congestion in the metropolitan area packet ring, wherein if bandwidth becomes available, newly available bandwidth is allocated to be used by the subscribers; and
a plurality of metropolitan packet switches providing the plurality of subscribers ~~are provided~~ with respective minimum bandwidth unidirectional QoS flows on a per-flow basis, by increasing and decreasing data rates at which existing individual flows of data packets are transmitted over the packet ring, the data rates increased or decreased on a per-flow basis, said increases and decreases performed while maintaining quality of service on a per-flow basis.

26. (Cancelled).

27. (Previously Presented) The method of Claim 25 further comprising the step of:
allocating the available bandwidth to flows according to a pre-determined weighting scheme.

28. (Previously Presented) The method of Claim *25* further comprising the step of:

controlling rates by which packetized data is allowed to be inserted onto the packet ring in order to provide quality of service for a set of the subscribers.

29. (Previously Presented) The method of Claim 28 further comprising the step of: reducing a data rate of an upstream flow to maintain the quality of service for a subscriber.

30. (Previously Presented) The method of Claim 25:
wherein the packet ring comprises a fiber optic loop and the packetized data is comprised of Ethernet packets.